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**For more information, please contact:**

Jeffrey Schimpff  
Environmental Analysis and Review Specialist  
PO Box 7921  
Madison, WI 53707-7921  
[Jeff.Schimpff@dnr.state.wi.us](mailto:Jeff.Schimpff@dnr.state.wi.us)  
608-267-7853



## **GRASSLAND COMMUNITIES**

### **Community Description**

The term grassland refers collectively to several native vegetation community types as well as to non-native habitats such as pastures, hay fields, small grains fields, and brome/alfalfa fields planted for nesting cover. These non-native grasslands are often referred to as surrogate grasslands. Surrogate grasslands meet the needs of some native fauna such as some birds and mammals, but not of others such as some invertebrates. This chapter considers prairies, sand barrens, fens, and non-native grasslands collectively as grasslands.

Prairies occur on a wide variety of topographies, soil types, and moisture regimes -- from water-covered peat to the driest sandy soils. Five native types of prairie are recognized: wet, wet-mesic, mesic, dry-mesic, and dry. Sand barrens are similar to dry prairies on sandy soils, but have sparse vegetation and include sand blows and exposed sands. Fens are a highly restricted type of wetland that supports unusually specialized plants. They form on wet to moist, often peaty, calcareous soils developed over diffuse groundwater that is very close to the surface. For more detailed descriptions of these vegetation types see Curtis (1959).

Grasslands are characterized by a lack of trees and tall shrubs. The biomass is dominated by grasses and sedges. However, the species composition is dominated by forbs. Some grasslands include a minor component of shrubs, usually less than 5% cover, which are important to some birds. Over 400 species of native vascular plants are characteristic of Wisconsin prairies, and most are restricted to prairie or savanna community types. In addition to a varied plant community, grasslands have a diverse and specialized fauna, especially among prairie invertebrates, prairie and grassland herptiles, and grassland birds.

Historically, native grasslands were maintained primarily by frequent fires, either started by lightening strikes or by Native Americans who burned large areas to produce food for game or to aid in hunting and gathering activities. On most soil types and moisture regimes in Wisconsin's climate, prairies in the absence of fire will succeed to woody species over time.

### **Global/Regional Context**

Wisconsin lies on the northeastern boundaries of the American prairies (see Figure 1). The prairies in Wisconsin are comprised of the tall grass prairie that were intermixed with oak savanna. Within the state, prairies are located southwest of the Tension Zone in a triangular area extending from Racine County to Grant and Polk Counties (Figure 2).

Tallgrass prairies, along with oak savanna, are among the most decimated and threatened natural communities in the Midwest and the world. Less than one percent of Wisconsin's original prairie still exists today. Wisconsin has some of the best opportunities for preservation and restoration of tallgrass prairie compared to other tallgrass prairie states such as Iowa and Illinois, where land use has been much more intensive. Soils and topography in Wisconsin have preserved more original prairie sod from cultivation than in these other states.

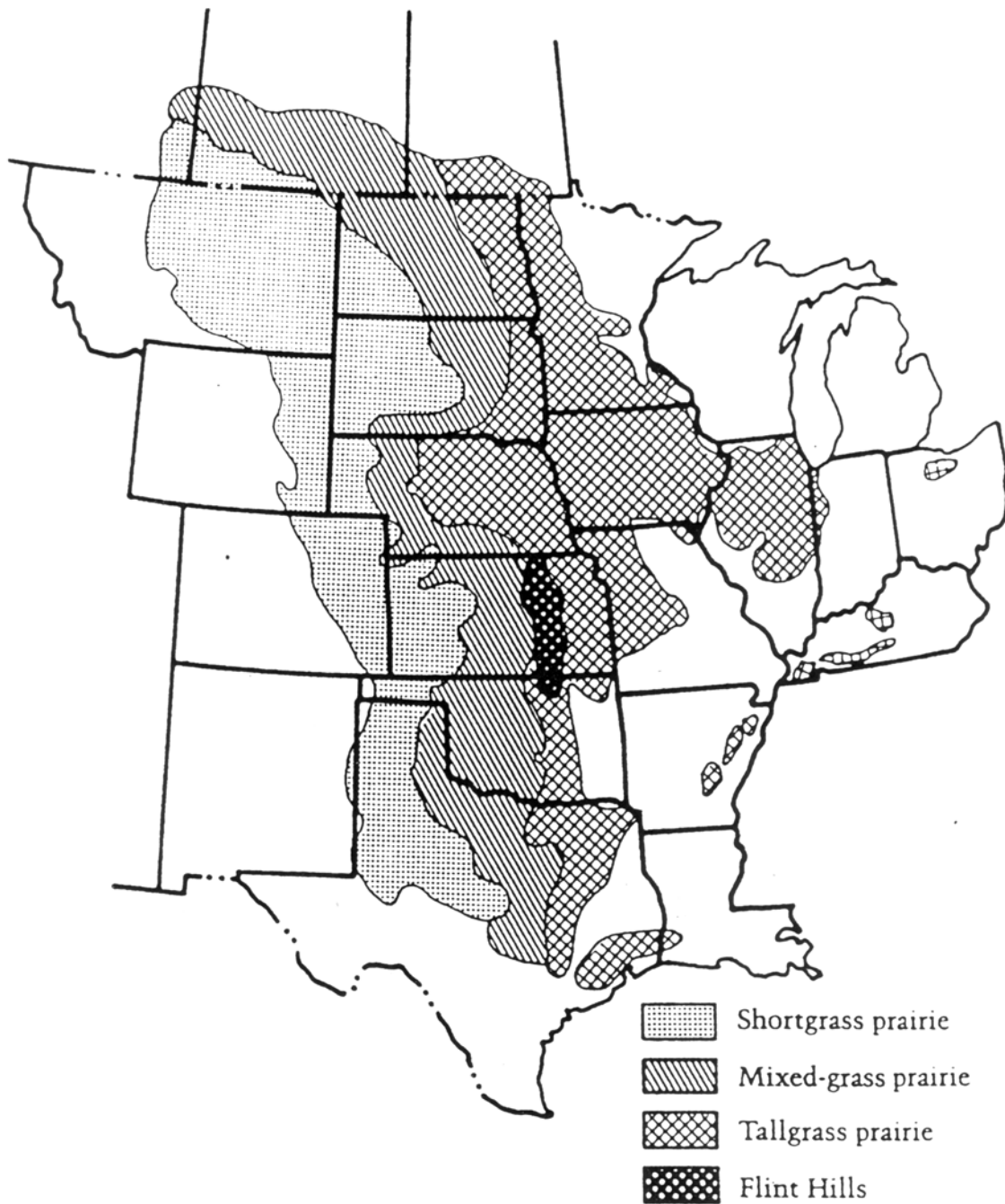


Figure 1. Prairie distribution at the time of European settlement. From: *Prairie Conservation-Preserving North America's Most Endangered Ecosystem*. 1996. Sampson & Knopf. 339 pp.

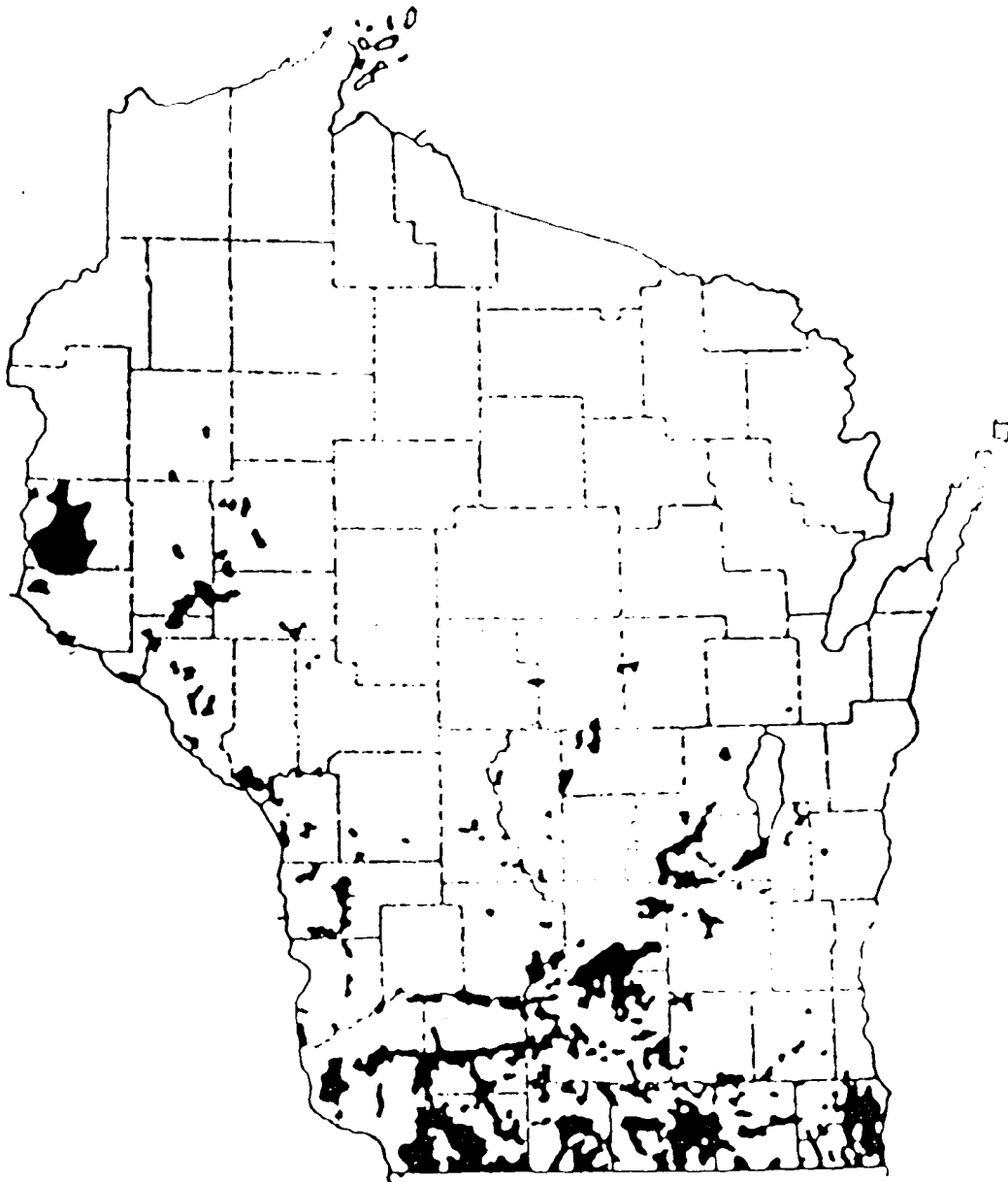


Figure 2. Original prairies. From: *Vegetation of Wisconsin*. Curtis. 1959. 657pp.

### **Issues of Function, Structure, and Composition**

Native grassland community composition, structure, and function are dependent on disturbance (primarily fire), and the location, size, and connectivity of remaining sites as well as on the soil type, moisture regime, and aspect.

Most prairie remnants sites are too small, isolated, and degraded (from lack of fire, overgrazing, invasion by exotics, etc.) to ensure long-term viability of all characteristic native plants and animals.

Most prairie sites have been plowed for agriculture (especially mesic sites), overgrown with woody vegetation, or grazed excessively. Loss of prairie remnants to urban/residential development is ongoing.

The predominant composition problem is the lack of native grasses and forbs and associated fauna that are characteristic of native prairie.

The predominant structure problem is the replacement of prairie grasses and forbs with monotypic agricultural crops, non-native grasses in the absence of fire, or the encroachment of trees and shrubs.

The predominant function problems for native prairies are the lack of fire or similar disturbance; competition with exotic plants, trees and shrubs; and isolation and fragmentation of prairie habitats. For non-native grasslands the predominant function problems are haying or grazing disturbance that is too intensive; not enough disturbance to prevent the encroachment of woody vegetation; and isolation and fragmentation of habitat patches.

Two plant species have been extirpated and 64 plant species are endangered, threatened, or of special concern in Wisconsin grasslands.

Not much is known about invertebrate species dependent on prairie. Species new to science are still being discovered in Wisconsin (5 species in 1993-94). Of those that are known, many prairie-dependent invertebrate species are extremely rare.

Grassland birds, in general, are declining dramatically in Wisconsin, the Midwest, and across North America. As a group, grassland birds are most in need of management attention. Twenty species of grassland birds are endangered, threatened, or of special concern in Wisconsin.

Species that require the largest grassland size are the prairie chicken, short-eared owls, northern harriers, and upland sandpipers. Some need 10,000 acres or more of continuous open landscape to maintain a viable population. Such large-scale landscapes should consist of at least 40% to 50% permanent grass and forb (noncrop) cover and should be committed to grassland for at least 10 years.

Three to 4 large native prairie sites (> 1,000 acres) that encompass existing native prairie remnants may need to be restored in the state to allow natural community processes to occur.

At least 7 large-scale grassland landscapes (> 10,000 acres) that include native prairie, surrogate grasslands, and agriculture may be needed to accommodate the requirements of some bird species (see list above).

Twenty-five medium-scale grassland landscapes (1,000-5,000 acres) that include native prairie, surrogate grasslands, and agriculture may be needed to accommodate vertebrates and some invertebrates across the range of former prairies.

Numerous scattered grassland sites of native or surrogate grasslands at least 40 acres (80 to 250 acres and larger are preferred) in size may need to be restored throughout the prairie region of the state to include all the diversity of prairie species.

Numerous native prairie remnants of any size may need to be preserved and managed to maintain the genetic diversity of native species across the prairie region of the state. These remnants may provide a “blueprint” and local genotype seed source for larger restorations.

### **Assessment of Current Condition**

Tallgrass prairies are among the most decimated and threatened natural communities in the Midwest and the world. Of the 2.1 million acres (6% of state land area) that were native prairie when Europeans arrived 150 years ago, less than 10,000 acres of varying quality (< 1 % of state land area) native prairie remains today.

Most native prairies found today in Wisconsin are small remnants. Most remnants are less than 10 acres in size and very few exceed 50 acres, too small to support a full compliment of species that typically inhabit a native prairie ecosystem. Most of the prairies left today are either of the wet or dry types. Mesic prairie, which was the most common type in pre-settlement days, is almost gone now, with only about 100 acres known to exist today. An estimated 15%-20% of the state's original grassland flora is now considered rare in the state.

Most grassland mammal species adapted to the changing conditions that followed European settlement, but some were extirpated such as the bison and elk and others remain rare such as prairie vole, Franklin's ground squirrel, and white-tailed jackrabbit.

While some grassland birds, such as whooping crane, long-billed curlew, and swallow-tailed kite, were extirpated relatively quickly after settlement, most species did not decline immediately but shifted to newly created agricultural habitat. But as agriculture has become more intensive in the last 40 years, grassland bird populations have been declining significantly. The barn owl and loggerhead shrike are endangered, the prairie chicken, Bell's vireo, and Henslow's sparrow are threatened and 15 other grassland bird species are considered of special concern in Wisconsin today.

Only about half of the prairie-associated reptiles and amphibians adapted to the loss of native prairie and still have good population levels today. Species like the ornate box turtle, western slender glass lizard, and massasauga rattlesnake are endangered; Blandings turtle is threatened; and the prairie ringneck snake and bull snake are of special concern.

Little is known about prairie invertebrates, but because of their close relationship to specific prairie plants it is believed that many prairie invertebrates are extinct, have been extirpated from the state, or are endangered, threatened, or rare today. Prairie invertebrate species new to science are still being discovered in Wisconsin today. We will never know what species were lost when the prairies were converted to other uses. Some is known about prairie butterflies and moths. Of this group of invertebrates alone, 19 species are of special concern, 2 are considered threatened, and 3 endangered in Wisconsin.

### **Land Use and Environmental Considerations**

Almost all of the former native prairie areas are now used for agricultural production. Some small dry and wet sites unsuitable for farming still exist as native prairie. However, lack of fire on these remaining native prairie sites is allowing trees, shrubs and non-native grasses to replace native prairie.

The high cost of productive agricultural and recreational land makes it difficult for conservation organizations to buy and restore native prairie, especially mesic prairie that occurs on prime farmland. The same is true for private landowners who may wish to restore native prairie but also need an economic return from the land.

Agricultural producers are concerned about the conversion of agricultural land to other uses and so may not be receptive to prairie/grassland restoration projects.

Rural residential development is increasing and fragmenting the rural agricultural landscape with houses, golf courses, and associated trees and shrubs. These residential developments can destroy, fragment, and affect the function of prairie remnants and other grasslands.

The high cost of native prairie plant seed prevents large areas of native prairie from being restored.

A limited source of local genotype native prairie plant seeds hinders restoration of large areas of native prairie.

Historically, a message of "all fire is bad" has created a cultural "fear of fire" that often hinders the use of prescribed

burning needed to maintain and restore native prairie.

Education is needed to inform the public of the necessity of fire for preserving prairie -- even on prairies in areas of high human density (i.e., Chiwaukee Prairie in the suburbs of Milwaukee or the UW-Arboretum prairies in Madison).

Increasing residential developments and air quality standards could reduce the use of prescribed burns as a management tool for maintaining native prairie.

Lack of cooperation among and within agencies is encouraging tree planting on existing native prairies and in areas that were historically prairie regions of the state. Shoreland zoning code is prohibiting or at least making it difficult to remove woody vegetation near wetlands and streams in grassland management areas.

Introduction of exotic species has degraded and eliminated some existing native prairies and makes it difficult to restore native prairie.

It is unlikely that large grassland landscapes will be preserved solely through voluntary actions of landowners, but adequate funding does not exist to be able to purchase land, easements, or development rights of the magnitude needed.

CRP has provided thousands of acres of grassland including some native plantings which can provide short-term cover (10 years) along with some economic gain for landowners.

### **Statewide Ecological Opportunities**

Wisconsin has opportunities to preserve some prairie types and many opportunities to restore tallgrass prairie types. It will be a difficult and costly job because most of the native prairie community and seed sources have been lost to decades of intensive agriculture or lack of burning. Most opportunities for restoring the grassland community occur in southern and western Wisconsin in the former prairie region south of the Tension Zone, although there are some grassland management opportunities for surrogate grasslands (such as CRP and other nonnative permanent grasslands) on former agricultural lands north of the Tension Zone shown in Figure 3.

To insure that the full range of species composition is preserved, grasslands should be restored across the entire former range of the prairies. All prairie types (wet to dry) and different soil types should be represented. Some former agricultural land will likely need to be restored to native prairie.

Grassland restoration is very feasible for most, but not all components of the grassland ecosystem. Restoration of a vast grassland landscape with megafauna such as bison, elk, and wolves in a naturally functioning grassland ecosystem is not feasible in today's landscapes in Wisconsin. However, restoration of small native landscapes and the management of large-scale landscapes that include both native and surrogate grasslands as well as agricultural lands will be able to accommodate most of the flora and fauna of the grassland community. Small restoration sites have the potential to support most plant species, most soil microfauna and microflora, and invertebrates species. Large sites will be needed to support most vertebrate species such as grassland birds, herptiles, and mammals.

Two strategies for maintaining grassland communities in Wisconsin should be considered. One is to preserve and protect remnant native prairies with sufficient buffers around them. The other, mentioned above, is to restore larger grassland landscapes that include native prairies but may also include surrogate grasslands (CRP and other nonnative permanent grasslands) and agricultural lands. Both strategies will be needed to restore and maintain the full spectrum of the grassland community. For more details on the number and size of grasslands needed, see the Biodiversity Report, Grassland chapter (WDNR 1995), and Sample and Mossman (1997).

The 26 priority landscapes and other sites for grassland restoration in Wisconsin are identified in Figure 3 taken from Sample and Mossman (1997). These landscapes encompass all the different prairie types and include both large and small-scale restoration landscapes. The top priority landscapes for grassland restoration south of the Tension Zone are:

Blue Mounds Grasslands  
Muralt/Monroe Grasslands  
Buena Vista/Leola Grasslands  
White River Marsh Complex  
Star Prairie Pothole Grasslands  
Yellowstone/Pecatonica River Grasslands  
Fort McCoy Barrens  
Lower Wisconsin River Prairies and Barrens

For more detailed descriptions of these priority grassland restoration areas, see Sample and Mossman (1997) and Henderson (1995). The Natural Heritage Inventory identifies sites with high quality native prairie remnants or where a listed species is present. However, additional inventory is needed to identify other remnant locations that may be of lesser quality but still may be valuable as a restoration site or source of local genotype seed.

As is done when implementing any significant landscape-scale ecosystem management project it will be important to balance ecological concerns with economic concerns, community interests, and impacts on residents.

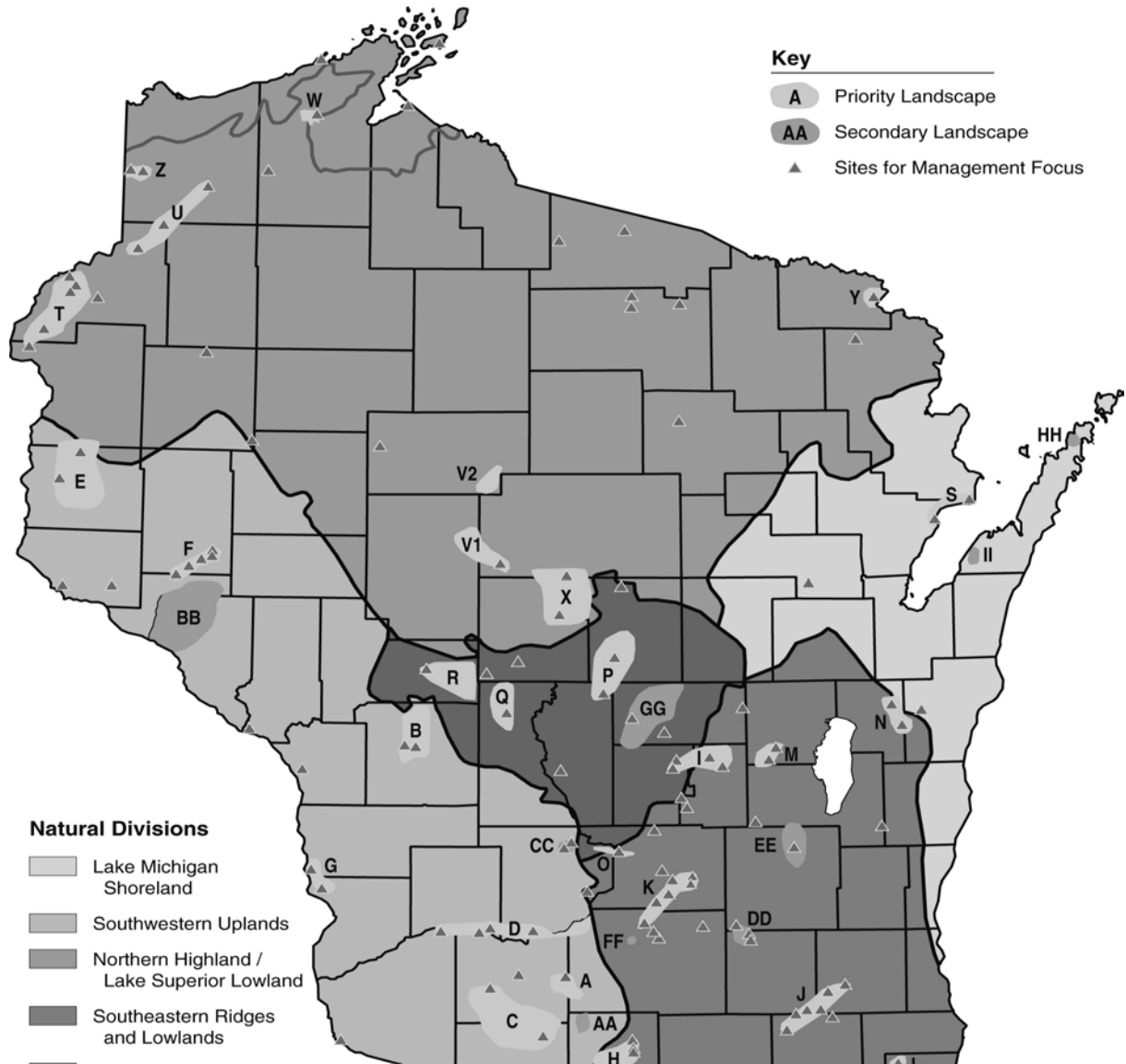
### **Data Sources**

Soil maps  
Presettlement vegetation (and better access to original land surveyor's notes) – prairie.  
Natural Heritage Inventory (or other local inventories) – current sites with rare prairie species available at:  
[http://www.dnr.state.wi.us/org/land/er/rare/natcomm\\_descripts.htm](http://www.dnr.state.wi.us/org/land/er/rare/natcomm_descripts.htm)  
WiscLand Current Vegetation and Land Use – current vegetation and land use.  
Land Ownership – identify areas with a conservation priority for grasslands.  
Wisconsin Breeding Bird Atlas  
CRP maps from county NRCS offices

### **Recommended Readings and References**

- Curtis, JT. 1959. The Vegetation of Wisconsin. University of Wisconsin Press, Madison, WI. 657 pages.
- Henderson, RA and J Krause. 1995. *Potential landscape scale management opportunities for southern Wisconsin's most threatened landscapes: open grassland/prairie, upland interior forest and savanna, and prairie/forest ecotone*. Wisconsin Department of Natural Resources, Madison, WI. 36 pages. [P-R Final Report: Study 331]
- Henderson, RA and DW Sample. 1995. Grassland Communities, in Wisconsin Department of Natural Resources, *Wisconsin's Biodiversity as a Management Issue*. Madison, WI. 240 pages.
- Herkert, JR, RE Szafoni, VM Kleen, and JE Schwegman. 1993. *Habitat establishment, enhancement, and management for forest and grassland birds in Illinois*. Illinois Department of Conservation. [Natural Heritage Technical Publication 1]
- Hoffman, RM and DW Sample. 1988. Birds of the wet-mesic and wet prairies in Wisconsin. *Passenger Pigeon* 50:2 143-152.
- Prairie Conservation-Preserving North America's Most Endangered Ecosystem. 1996. Sampson & Knopf. 339 pp.
- Sample, DW and RM Hoffman. 1989. Birds of dry-mesic and dry prairies in Wisconsin. *Passenger Pigeon* 51:2 195-208.
- Sample, DW and MJ Mossman. 1997. *Managing Habitat for Grassland Birds: a guide for Wisconsin*. Wisconsin Department of Natural Resources, Madison, WI. 154 pages. [SS-925-97]





**Figure 3.** Location of priority landscapes and sites for grassland bird management in Wisconsin.

**Figure 3 Key.**

<u>Map Location<sup>c</sup></u>	<u>Rank<sup>b</sup></u>	<u>Priority Landscape</u>
<b>Southwestern Upland</b>		
A	1	Thomson Prairie Grasslands
B	9	Fort McCoy Barrens
C	8	Yellowstone/Pecatonica River Grasslands and Savannas
D	10	Lower Wisconsin River Prairies and Barrens
E	6	Star Prairie Pothole Grasslands
F	17	Lower Chippewa River Savannas and Prairies
G	26	Rush Creek/Battle Bluff Goat Prairies and Savannas
<b>Southeastern Ridges and Lowlands</b>		
H	3	Muralt/Monroe Grasslands
I	5	White River Marsh Complex <sup>c</sup>
J	18	Southern Kettle Moraine Complex
K	16	Columbia/Dane County Prairie Wetlands
L	15	Bong Recreation Area
M	19	Rush Lake Grasslands and Sedge Meadows
N	22	Brillion/Killsnake Grasslands
O	23	Pine Island Area Grasslands
<b>Central Plains</b>		
P	4	Buena Vista/Leola Grasslands
Q	14	Necedah Barrens
R	21	Bear Bluff Wetlands
<b>Lake Michigan Shoreland</b>		
S	24	Green Bay West Shore Sedge Meadows
<b>Northern Highland/Lake Superior Lowland</b>		
T	2	Crex Meadows/Fish Lake Complex
U	7	Namekagon/Douglas County Barrens
V (1,2)	12	North Central Prairie Chicken Grasslands
W	11	Moquah Barrens
X	20	Mead/Paul J. Olson Grasslands
Y	13	Spread Eagle Barrens
Z	25	Black Lake/Belden Swamp

<sup>a</sup> Alphabetical order reflects ranking within natural division. For example, in the Southwestern Upland, A is highest-ranking and G is lowest.

<sup>b</sup> See Appendix G. Note that landscapes are not ranked in the same order statewide as they are within each natural division. This is due to differences in the scale of the two rankings. For example, because Fort McCoy Barrens is unique in the Southwestern Upland as the largest and best barrens landscape in that division, it ranks high in the division but is outranked by some surrogate grassland landscapes in the statewide ranking.

<sup>c</sup> The White River Marsh Complex includes sites in both the Southeastern and Central natural divisions, and therefore is included in the maps for both of those divisions (Figures 10 and 11).

### Ecological Opportunities by Ecological Landscape

Grassland Opportunities by Ecological Landscape	Dry Prairie	Dry-mesic Prairie	Mesic Prairie	Wet-mesic Prairie	Wet Prairie	Sand Barrens	Fens	Nonnative grasslands
Superior Coastal Plain								x
Northwest Lowlands								
Northwest Sands	x	x	p	p	p	x	p	x
North Central Forest								p
Northern Highland								p
Northeast Hills								p
Northeast Sands	x	x						p
Farm-Forest Transition		p	p	p	p			x
Northeast Plains								p
Northern Lake Michigan Coastal				p	p		p	p
Western Prairie	x	x	xx	xx	x		p	xx
Central Sand Plains	xx	xx	x	x	xx	p	xx	x
Western Coulees and Ridges	xx	xx	xx	x	x	xx	x	xx
Central Sand Hills	x	xx	x	x	x	p	x	x
Southwest Savanna	xx	xx	x	x	x			xx
Southeast Glacial Plains	x	x	xx	xx	xx		x	x
Southern Lake Michigan Coastal		p	xx	xx	xx			x

xx = Major Significant Opportunity

x = Minor Significant Opportunity

p = present

blank = absent



Bird's-foot violet (*Viola pedata*), a prairie and savanna species limited to well drained rocky, gravelly, or sandy substrates.



Hawk Hill, Dane County. An example of dry prairie on rocky bluffs.



A dry-mesic prairie with Rosinweed (*Silphium intergrifolium*) and Rattlesnake master (*Eryngium yuccifolium*)



Faville Prairie State Natural Area, Jefferson County. An example of wet-mesic prairie with characteristic Prairie blazing star (*Liatris pycnostachya*).